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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/799,413	03/12/2004	Angela T. Hui	AF01158	7136

7590

05/16/2005

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EXAMINER

MAI, ANH D

ART UNIT	PAPER NUMBER
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2814

DATE MAILED: 05/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

Office Action Summary

Application No.

10/799,413

Applicant(s)

HUI ET AL.

Examiner

Anh D. Mai

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 March 2005.
 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
 4a) Of the above claim(s) 6-9 is/are withdrawn from consideration.
 5) ☐ Claim(s) _____ is/are allowed.
 6) ☒ Claim(s) 1-5 and 10-15 is/are rejected.
 7) ☐ Claim(s) _____ is/are objected to.
 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
 10) ☒ The drawing(s) filed on 15 March 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
 * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
 Paper No(s)/Mail Date 3/15/2004.
 4) ☐ Interview Summary (PTO-413)
 Paper No(s)/Mail Date. _____.
 5) ☐ Notice of Informal Patent Application (PTO-152)
 6) ☐ Other: _____.

DETAILED ACTION

1. Applicant's election without traverse of Group I, claims 1-5 and 10-15 in the reply filed on March 30, 2005 is acknowledged.
2. Claims 6-9 have been withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on March 30, 2005.

Drawings

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "etching said remaining portion of said ARC layer" (claim 1, line 21) must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet"

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pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 5 and 15 rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claim 5 and 15 recite: "wherein said insulating material comprises thermal oxide".

However, claims 1 and 10 recited that the insulating material is deposited.

The "thermal oxide" is well known in the art to be thermal oxidation or thermally grown oxide.

At most, the specification, page 7, lines 19-20, discloses: trench 14, is filled with an insulating material 18, e.g., thermal oxide, as illustrated in Figure 3A.

How the thermal oxide is deposited ?

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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5. Claims 1-5 and 10-15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1, lines 9-11, recites: “etching a portion of said ARC layer over said STI region leaving a remaining portion of said ARC layer over said STI region and extending beyond the boundaries of said STI region”

How can etching a portion of ARC that lies over the STI region and still leaving the remaining portion of ARC over the STI ?

Once removed, the ARC is *no longer* situated over the STI, however, the limitation seems to indicate that nothing is removed or at most a top portion is removed.

Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Similarly, lines 12-14 recites: “etching an exposed portion of said polysilicon layer and said gate oxide layer over said STI region leaving a remaining portion of said polysilicon layer and said gate oxide layer over said STI region and extending beyond the boundaries of said STI region”.

The similar also applies to claim 10, lines 7-9.

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6. Claim 1 recites the limitation "etching an exposed portion of said polysilicon layer and said gate oxide layer over said STI region" in lines 12-13. There is insufficient antecedent basis for this limitation in the claim.

Neither the polysilicon nor the gate oxide **have been exposed**, because the ARC layer is still remaining over the STI region and extending beyond the boundaries of the STI region. (See lines 9-11).

7. Where applicant acts as his or her own lexicographer to specifically define a term of a claim contrary to its ordinary meaning, the written description must clearly redefine the claim term and set forth the uncommon definition so as to put one reasonably skilled in the art on notice that the applicant intended to so redefine that claim term. *Process Control Corp. v. HydReclaim Corp.*, 190 F.3d 1350, 1357, 52 USPQ2d 1029, 1033 (Fed. Cir. 1999). The term "thermal oxide" in claims 5 and 15 is used by the claim to mean "the type of oxide that deposited in the trench", while the accepted meaning is "high temperature CVD oxide" The term is indefinite because the specification does not clearly redefine the term.

In the art the term "thermal oxide" is directed to oxide growing by thermal oxidation. Therefore, thermal oxide is not deposited oxide as the invention intended.

How the thermal oxide is deposited ?

The deposition of "thermal oxide", seem to be an invention by itself.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 10, 11, 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsu et al. (U.S. Patent No. 6,197,637) in view of Yang et al. (U.S. Patent No. 6,110,779).

With respect to claim 10, as best understood by the examiner, Hsu teaches a method for avoiding oxide gouging in isolation regions of a semiconductor device substantially as claimed including:

forming an isolating material (230) in an isolation region;

depositing an anti-reflective coating (ARC) layer (241a) over the isolation region and extending beyond the boundaries of the isolation region;

etching a portion (242) of the ARC layer (241a) over the isolation region leaving a remaining portion of the ARC layer (241a) over the edge of the isolation region and extending beyond the boundaries of the isolation region;

depositing a protective cap (246) covering the isolation region (230) and extending beyond the boundaries of the isolation region, wherein the protective cap (246) covers the remaining portion of the ARC layer (241a) and the insulating material (230) over the isolation region. (See Figs. 5B-C).

Thus, Hsu is shown to teach all the features of the claim with the exception of utilizing STI as isolation regions.

However, Yang teaches that STI (76) can be alternatively used as isolation regions (see Fig. 4) and the process is well known to include: etching a trench in an STI region; and depositing an insulating material in the trench. (See Fig. 4).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to form the isolation region of Hsu utilizing the STI as taught by Yang because STI can be formed with narrow profile and devoid of bird's beak, hence more active surface area, thus more devices can be formed on a given semiconductor surface (ULSI).

Regarding the ARC, many materials, such as oxide, nitride and oxynitride, can be used for, or function as, ARC. The materials 241a of Hsu or 60 of Yang are one of them.

With respect to claim 11, the method of Hsu further comprises:

etching a portion of the protective cap (246) to expose the remaining portion of the ARC layer (241a) while maintaining protection of the insulating material (230); and

etching the remaining portion (241) of the ARC layer (241a);

wherein the insulating material (230) is protected during etching of the remaining portion (241) of the ARC layer (241a) by the protective cap (247). (See Figs. 5C-E).

With respect to claim 14, in view of Yang, the remaining portion of the ARC layer (60) can be etched using dry etch, hence plasma etch process.

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With respect to claim 15, as best understood by the examiner, the insulating material (230) of Hsu comprises thermal oxide.

9. Claims 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsu '637 and Yang '779 as applied to claim 10 above, and further in view of Tripsas et al. (U.S. Patent No. 6,034,395).

Hsu teaches depositing a protective cap (246) covering the isolation region (230) and extending beyond the boundaries of the isolation region.

Thus, Hsu is shown to teach all the features of the claim with the exception of depositing protective cap utilizing photoresist material.

However, Tripsas teaches: photoresist material are known to use as a protective cap (40). (See Fig. 3a).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to deposit the protective cap of Hsu utilizing photoresist material as taught by Tripsas because the photoresist is deposited by spin-on, thus simplifies the process, hence more through put.

With respect to claim 13, the protective cap (40) of Tripsas is deposited to cover the polysilicon having a thickness of 600 Å to 1100 Å, thus, the protective cap (40) should have a thickness approximately the same.

Note that, the claimed thickness does not appear to be critical.

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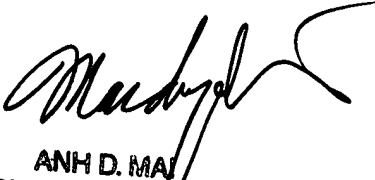
The specification contains no disclosure of either the *critical nature of the claimed thickness of the photoresist material* of any unexpected results arising therefrom. Where patentability is aid to based upon particular chosen dimension or upon another variable recited in a claim, the Applicant must show that the chosen dimension are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anh D. Mai whose telephone number is (571) 272-1710. The examiner can normally be reached on 9:00AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


ANH D. MAI
PRIMARY EXAMINER
May 11, 2005